AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Clinical Microbiology®

LETTER TO THE EDITOR

Performance Characteristics of the Roche Diagnostics cobas Liat PCR System as a COVID-19 Screening Tool for Hospital Admissions in a Regional Health Care Delivery System

Douglas Blackall,[a] Raymond Moreno,[a] Justin Jin,[a] Rachel Plotinsky,[a] Ronald Dworkin,[a] Margret Oethinger[a]

[a]Providence Health and Services, Portland, Oregon, USA

KEYWORDS COVID-19, PCR, SARS-CoV-2, coronavirus

The COVID-19 pandemic has required rapid implementation of multiple instrumentation platforms to detect SARS-CoV-2. This has required clinical laboratories to develop their own tests or adopt commercial tests approved for use through FDA emergency use authorization (EUA).

The Oregon Region of Providence Health and Services is comprised of 8 community hospitals of various sizes (25 to over 500 licensed beds). A COVID-19 outbreak in one of the hospitals, involving both patients and caregivers, served as the driving force to implement rapid molecular testing for SARS-CoV-2 with the goal of identifying asymptomatic carriers. This testing would also assist in directing patient disposition and preserving resources. The cobas Liat system (Roche Diagnostics Corporation, Indianapolis, IN), a multiplex real-time PCR test platform, was chosen as the screening tool, as it had already been implemented for rapid influenza testing in each hospital. In addition, there was an adequate supply of test kits (cobas Liat SARS-CoV-2 and influenza A/B assay) to support testing in this manner (~1,500 patients encountered each week over the 8 hospitals). All testing was performed on nasopharyngeal swab specimens collected by health care workers. Specimens were placed in viral transport medium (Merit Medical, South Jordan, UT) before testing and were transported and stored refrigerated.

Soon after the cobas Liat test kits were validated in our hospital laboratories, the FDA issued an alert indicating the possibility of false-positive testing results with the cobas Liat (1). In addition, we experienced several instances in which there appeared to be discrepancies between cobas Liat testing and SARS-CoV-2 nucleic acid testing performed on other platforms. This led us to initiate a quality assurance project aimed at assessing the performance characteristics of the cobas Liat as a screening tool for COVID-19. To preserve reagents and since false-negative results did not appear to be an issue, we chose to repeat testing on all positive cobas Liat tests using the same specimen collection on another PCR-based platform in our centralized reference laboratory. For purposes of this communication, cobas Liat testing is assumed to be our "screening test," while reference lab testing, using either the Roche cobas 6800 or the BD MAX, is referred to as our "confirmatory test."

Over the first 2 months of our program (23 March to 23 May 2021), over 12,000 tests were performed on the cobas Liat. Of these, ~95% were negative. As described above, these results were not confirmed with secondary testing. Of 641 SARS-CoV-2-positive cobas Liat screening tests, 628 (or 5.1% of the total) were received in our core laboratory for confirmatory testing from 618 unique patients. These data are found in Table 1, stratified by a symptomatic or asymptomatic patient designation, which was available in each hospitals' electronic health record (Epic Systems

Citation Blackall D, Moreno R, Jin J, Plotinsky R, Dworkin R, Oethinger M. 2021. Performance characteristics of the Roche Diagnostics cobas Liat PCR system as a COVID-19 screening tool for hospital admissions in a regional health care delivery system. J Clin Microbiol 59:e01278-21. https://doi.org/10.1128/JCM.01278-21.

Editor Melissa B. Miller, UNC School of Medicine

Address correspondence to Douglas Blackall, douglas.blackall@providence.org.

Accepted manuscript posted online 28 July 2021

Published 20 September 2021

TABLE 1 Roche cobas Liat SARS-CoV-2 testing data

Result	Overall	Symptomatic	Asymptomatic
Negative (no.)	11,718	3,058	8,660
Negative (%)	94.8	87.0	97.9
Positive (no.)	641	458	183
Positive (%)	5.2	13.0	2.1
Total (no.)	12,359	3,516	8,843

Corporation, Verona, WI). An assessment of the cobas Liat-positive test results is provided in Table 2. The overall false-positive rate (i.e., screening test positive, confirmatory test negative) was 9.6%, with striking differences between the symptomatic and asymptomatic patient populations. There was significant variability in false-positive rates across the 8-hospital system, ranging from 0% to 17% (data not shown). There was also variability in the false-positive rate depending on the confirmatory testing platform employed: 4.2% for the BD MAX and 15.9% for the Roche cobas 6800. This difference may relate to differing limits of detection for each assay. Of note, there was an early cluster of 4 consecutive false-positive test results at one of the hospitals that was attributed to a leaky test cartridge. These results are not included in this performance assessment. Aside from this, false-positive results were sporadic rather than clustered and were not associated with leaking test cartridges. False-positive rates did not change substantially over the length of the project.

The cobas Liat false-positive rate that we experienced was far higher than that identified in a recent publication (2). It is also higher than the rate of false-positive results that we might have expected from an Urgent Medical Device Correction issued by Roche Diagnostics Corporation (3). However, it is important to note that another factor played a role: we used the cobas Liat as a SARS-CoV-2 screening tool in a predominantly asymptomatic patient population, which was not the intent of the original EUA for this assay (i.e., use in symptomatic individuals suspected of respiratory viral infection consistent with COVID-19) (4). In a low-prevalence population, a somewhat higher false-positive rate is expected due to a lower predictive value of a positive test. This was largely borne out in differing false-positive rates between symptomatic and asymptomatic patients: 3.8% and 23.9%, respectively.

Despite concern over false-positive cobas Liat results, screening of all new inpatients has had tremendous logistical benefits for our organization. Since 95% of initial cobas Liat tests were negative for SARS-CoV-2 RNA, streamlined patient admissions could ensue without the need for either special segregation or the excessive use of personal protective equipment. Rather, attention was paid to those patients, 5% of the total screened, who initially tested cobas Liat positive. These patients were designated presumptively positive for COVID-19 and were treated as such until the results of confirmatory testing were available (on average, within 9 h of cobas Liat testing, with 95% completed within 24 h).

In conclusion, although the cobas Liat PCR system had a relatively high false-positive rate in our assessment, when used as a screening tool in a predominantly asymptomatic patient population, it has provided improved hospital operational efficiency across our regional health care system. We will continue our 2-stage testing approach

TABLE 2 Focused evaluation of positive Roche cobas Liat SARS-CoV-2 testing results

Sample type	Total (*n*)	True positive (*n*)	False positive (*n*)	False-positive rate (%)
Symptomatic	448	431	17	3.8
Asymptomatic	180	137	43	23.9
Overall	628	568	60	9.6

for cobas Liat-positive results to gain additional knowledge and understanding of how best to use this molecular technology.

REFERENCES

1. US Food and Drug Administration. 2021. Potential for false results with Roche Molecular Systems, Inc. cobas SARS-CoV-2 & Influenza Test for use on cobas Liat System-letter to clinical laboratory staff, point-of-care facility staff, and health care providers. https://www.fda.gov/medical-devices/letters-health-care-providers/potential-false-results-roche-molecular-systems-inc-cobas-sars-cov-2-influenza-test-use-cobas-liat.
2. Hansen G, Marino J, Wang Z-X, Beavis KG, Rodrigo J, Labog K, Westblade LF, Jin R, Love N, Ding K, Garg S, Huang A, Sickler J, Tran NK. 2021. Clinical performance of the point-of-care cobas Liat for detection of SARS-CoV-2 in 20 minutes: a multicenter study. J Clin Microbiol 59:e02811-20. https://doi.org/10.1128/JCM.02811-20.
3. Roche Diagnostics Corporation. 2021. cobas SARS-CoV-2 & Influenza A/B assay for use under emergency use authorization-potential for invalid or false positive results. Roche Diagnostics Corporation, Indianapolis, IN.
4. US Food and Drug Administration. 2020. Emergency use authorization. https://www.fda.gov/media/142190/download.